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(54) MANUFACTURING APPARATUS FOR LIQUID CRYSTAL ELEMENTS

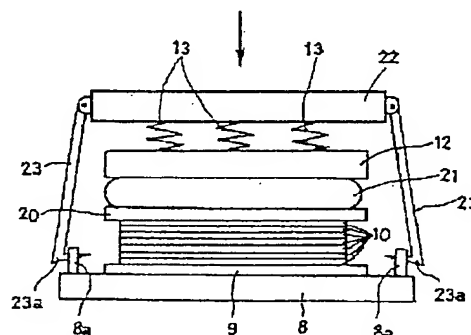
(57) Abstract:

PROBLEM TO BE SOLVED: To make surface pressure distribution of respective substrates uniform, even if there are variations in the pressurization distribution on a pressurizing means side.

SOLUTION: A pair of glass substrates holding a sealing material are formed as one set of a substrate body 10. Plural sets of the substrate bodies 10 are laminated and are arranged on a base plate 8. An auxiliary plate 20 is arranged on the substrate body 10 of the uppermost part and a pressure distributing member 21 including fluid is arranged between the auxiliary plate 20 and a pressurizing plate 12. The pressurizing plate 12 is pressurized via coil springs 13 by a pressurizing member 22 in this state. Accordingly, when the pressurizing plate 12 is pressurized, the substrate bodies 10 of the respective sets are pressurized via the pressure distributing member 21, and at this time, even if the variations in the pressurization distribution are induced on the pressurizing means side by factor, such as deformity and uneven contact of the pressurizing plate 12 and the change in the

spring constants of the coil springs 13, the fluid in the pressure distributing member 21 flows according to the variations for absorbing the variations in the pressurization distribution, and therefore, the surface pressure distribution of the respective substrates 2 and 3 is made uniform.

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[Claim(s)]

[Claim 1] The sealant which forms the space for enclosing liquid crystal between the substrates of a couple is made to pinch between the substrates of said couple. As the substrate of these couples is made into 1 set and the substrate of 1 or more sets of said couples is piled up at least, make the outermost side of these substrates counter said pressurizing plate between pressurizing plates, and it arranges. By pressurizing the substrate of 1 or more sets of said couples by a force means through said pressurizing plate in this state The manufacturing installation of the liquid crystal device characterized by having arranged the pressure distribution member which connotes a fluid among the substrates of 1 or more sets of said couples between the outermost substrate and said pressurizing plate which counters this in the manufacturing installation of the liquid crystal device which joins the substrate of 1 or more sets of said couples through said sealant.

[Claim 2] The manufacturing installation of the liquid crystal device according to claim 1 characterized by having a heating means to form said sealant with thermosetting adhesive and to heat with the curing temperature of said sealant.

[Claim 3] Said fluid of said pressure distribution member is the manufacturing installation of the liquid crystal device according to claim 1 characterized by being the matter which has thermal resistance, such as silicone oil and silicone gel.

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the manufacturing installation of the liquid crystal device for joining the substrate of the couple of a liquid crystal device in more detail about the manufacturing installation of a liquid crystal device.

[0002]

[Description of the Prior Art] Conventionally, the liquid crystal device 1 forms the transparent electrode 4 and 5 in the transparent glass substrate 2 of a couple, and the opposed face of 3, respectively, as shown in drawing 2 . By forming the sealant 6 in the glass substrate 2 of these couples, and the periphery section between three, and joining

the glass substrate 2 of a couple, and 3 by this sealant 6, the glass substrate 2 of a couple and the space enclosed by the sealant 6 among three are formed, and it has composition which encloses liquid crystal 7 in this space. In this case, the sealant 6 consists of thermosetting adhesives, such as epoxy system resin.

[0003] In such a liquid crystal device 1, there are some which were constituted as the glass substrate 2 of a couple and 3 were shown in drawing 3 as a manufacturing installation for joining by the sealant 6, for example. That is, on the base plate 8 which is the pedestal of this manufacturing installation, the bottom elastic plate 9 which consists of heat-resistant rubber etc. is arranged. On this bottom elastic plate 9, the glass substrate 2 of a couple with which the sealant 6 intervened, and 3 are used as 1 set of board bodies 10, and two or more sets of 1 set of these board bodies 10 are laminated. On 1 set of this laminated topmost part of board bodies 10, the pressurizing plate 12 is arranged through the upside elastic plate 11 which consists of heat-resistant rubber etc., and the pressure portion material 14 is arranged through two or more coiled spring 13 on this pressurizing plate 12. In addition, this manufacturing installation is equipped with a heating means (not shown) to heat with the curing temperature of the sealant 6.

[0004] [this manufacturing installation] by pressurizing the pressurizing plate 12 through two or more coiled spring 13 by the pressure portion material 14 The glass substrate 2 of the couple of each class and 3 are joined at once by pressurizing at once two or more sets of board bodies 10 laminated through the upside elastic plate 11, heating by a heating means in this state, and stiffening the glass substrate 2 of the couple of each class, and the sealant 6 between three.

[0005]

[Problem(s) to be Solved by the Invention] however, [such a conventional manufacturing installation] The pressurizing plate 12 is pressurized through two or more coiled spring 13 by the pressure portion material 14. [with factors, such as deformation of the pressurizing plate 12 and change of the spring constant by degradation of per piece or the coiled spring 13,] when pressurizing at once two or more sets of board bodies 10 laminated through the upside elastic plate 11 If dispersion arises in the application-of-pressure distribution by the side of the force means of the pressure portion material 14, the coiled spring 13, etc. There is a problem that planar pressure distribution of the board body 10 of each class laminated in connection with this will become an ununiformity, and the glass substrate 2 of the couple of each class after heating and the gap G between three will become an ununiformity for this reason.

[0006] Even if the technical problem of this invention has dispersion in the application-of-pressure distribution by the side of a force means, it is planar pressure distribution of each substrate being made to homogeneity, and enabling it to form the gap between the substrates of a couple in homogeneity by this.

[0007]

[Means for Solving the Problem] This invention makes the sealant which forms the space for enclosing liquid crystal between the substrates of a couple pinch between the substrates of said couple. As the substrate of these couples is made into 1 set and the substrate of 1

or more sets of said couples is piled up at least, make the outermost side of these substrates counter said pressurizing plate between pressurizing plates, and it arranges. By pressurizing the substrate of 1 or more sets of said couples by a force means through said pressurizing plate in this state In the manufacturing installation of the liquid crystal device which joins the substrate of 1 or more sets of said couples through said sealant, it is characterized by having arranged the pressure distribution member which connotes a fluid among the substrates of 1 or more sets of said couples between the outermost substrate and said pressurizing plate which counters this. Since the pressure distribution member which connotes a fluid among the substrates of 1 or more sets of couples between the outermost substrate and the pressurizing plate which counters this has been arranged according to this invention When a pressurizing plate is pressurized by a force means, it will be pressurized by the substrate of 1 or more sets of couples through a pressure distribution member, and at this time For example, even if dispersion arises in application-of-pressure distribution with deformation of a pressurizing plate and factors, such as per piece, at the force means side, in order for the fluid in a pressure distribution member to flow according to the dispersion and to absorb dispersion in application-of-pressure distribution, Planar pressure distribution of each substrate can be made into homogeneity, and, thereby, the gap between the substrates of a couple can be formed in homogeneity.

[0008] In this case, by having a heating means to form a profit according to claim 2 and a sealant with thermosetting adhesive, and to heat with the curing temperature of this sealant After it pressurized by the force means and the pressure distribution member has maintained planar pressure distribution of each substrate at homogeneity, it can heat with the curing temperature of a sealant by a heating means, a sealant can be stiffened, and, for this reason, the gap between the substrates of a couple can be formed in homogeneity with a sufficient precision. When [moreover,] the fluid of a profit according to claim 3 and a pressure distribution member is the matter which has thermal resistance, such as silicone oil and silicone gel Even if it pressurizes each substrate by a force means and heats by a heating means in this state at the curing temperature of a sealant, there is almost no pressure variation by the thermal expansion of a fluid, and, for this reason, it can pressurize by the about 1 constant-pressure force during heating.

[0009]

[Embodiment of the Invention] With reference to drawing 1 , one embodiment of the manufacturing installation of the liquid crystal device of this invention is explained hereafter. In addition, the same sign is given to the same part as the conventional parallel shown in drawing 2 and drawing 3 , and the explanation is omitted. Drawing 1 is the front view having shown the manufacturing installation of the liquid crystal device. On the base plate 8 (it is equivalent to one pressurizing plate) which is a pedestal in this drawing Like the 1st embodiment, the bottom elastic plate 9 is arranged, on this bottom elastic plate 9, the glass substrate 2 of a couple with which the sealant 6 intervened, and 3 are used as 1 set of board bodies 10, and two or more sets of 1 set of these board bodies 10 are laminated. On 1 set of this laminated topmost part of board bodies 10, the pressure distribution member 21 is arranged through the auxiliary plate 20. The pressure distribution member 21 has the

composition of having connoted the fluid free [floating] in the saccate package inside of the body. A fluid has a fluidity, and also has thermal resistance, and consists of matter, such as silicone oil and silicone gel, for example, and the heat-resistant temperature is [pressure resistance] about two 0.4 kg/cm at about 180 degrees C. In addition, the auxiliary plate 20 has prevented the space where it is monotonous, and is formed more greatly than the glass substrate 2 of each class and the size of 3, and the glass substrate 2 of a couple and the liquid crystal 7 in 3 which have rigidity are enclosed, and a corresponding part bending by the pressure distribution member 21.

[0010] Moreover, like the 1st embodiment, the pressurizing plate 12 (it is equivalent to the pressurizing plate of another side) is arranged, and the pressure portion material 22 is arranged through two or more coiled spring 13 on this pressurizing plate 12 at the pressure distribution member 21 top. In this case, the clamp arm 23 is attached to the both ends of the pressure portion material 22 rotatable, respectively. [these clamp arm 23] when the pressure portion material 22 pressurizes the pressurizing plate 12 through two or more coiled spring 13 and becomes a constant pressure The hook section 23a of the soffit section of each clamp arm 23 engages with the catching part 8a prepared on the base plate 8, and it is constituted so that this may maintain the application-of-pressure state of a constant pressure. In addition, this manufacturing installation is held in a heating furnace (not shown) with an application-of-pressure state, and when the curing temperature 6 of the sealant 6, for example, a sealant, is epoxy system resin, it is heated at about 140 degrees C.

[0011] [the state where used as 1 set of board bodies 10 the glass substrate 2 of a couple with which the sealant 6 intervened, and 3 in the manufacturing installation of such a liquid crystal device, and two or more sets of 1 set of these board bodies 10 were made to laminate] It arranges between the bottom elastic plate 9 on a base plate 8, and the auxiliary plate 20. If the pressure distribution member 21 is arranged between this auxiliary plate 20 and pressurizing plate 12 and the pressurizing plate 12 is pressurized through two or more coiled spring 13 by the pressure portion material 14 in this state, two or more sets of board bodies 10 laminated through the pressure distribution member 21 and the auxiliary plate 20 will be pressurized. [with factors, such as deformation of the pressurizing plate 12 and change of the spring constant by degradation of per piece or the coiled spring 13,] at this time Even if dispersion arises in application-of-pressure distribution at the force means side of the pressure portion material 22, the coiled spring 13, etc., in order for the fluid in the pressure distribution member 21 to flow according to the dispersion and to absorb dispersion in application-of-pressure distribution, The planar pressure distribution 2 of two or more sets of laminated board bodies 10, i.e., the glass substrate of each class, and planar pressure distribution of 3 can be made into homogeneity.

[0012] Thus, when two or more sets of laminated board bodies 10 are pressurized and it becomes a constant pressure, the hook section 23a of each clamp arm 23 of the pressure portion material 22 will be stopped by the catching part 8a of a base plate 8, and the state where two or more board bodies 10 of the group were pressurized by the constant pressure by this will be maintained. And it holds in a heating furnace with this state, it heats in this

heating furnace with the curing temperature (for example, about 140 degrees C) of the sealant 6, and the sealant 6 is stiffened. Since the fluid of the pressure distribution member 21 consists of silicone oil, silicone gel, etc. which have thermal resistance at this time, the heat-resistant temperature is about 180 degrees C and the pressure variation by the thermal expansion of a fluid hardly arises, Planar pressure distribution of two or more sets of board bodies 10 which could maintain the application-of-pressure state of the about 1 constant-pressure force during heating, and were laminated by the pressure distribution member 21 also in heating for this reason is uniform. And the glass substrate 2 of each class and the sealant 6 between three can be stiffened with the application-of-pressure state of a constant pressure maintained, and, thereby, the glass substrate 2 of a couple and the gap G between three can be formed in homogeneity with a sufficient precision.

[0013] In addition, in the above-mentioned embodiment between the bottom elastic plate 9 on a base plate 8, and the auxiliary plate 20 by the side of the pressurizing plate 12 Although the case where made the glass substrate 2 of a couple with which the sealant 6 intervened, and two or more sets of board bodies 10 which make 3 1 set laminate, and two or more sets of these laminated board bodies 10 were pressurized at once was described Not only this but 1 set of the glass substrate 2 of a couple with which the sealant 6 intervened, for example and 3 are arranged, and you may make it pressurize it. Moreover, in the above-mentioned embodiment, although the matter of a silicone system was used as a fluid of the pressure distribution member 21, as long as it has not only this but thermal resistance, you may use fine particles, such as liquids, such as oil, semisolids, such as grease, and particles, etc., for example.

[0014] Moreover, although the glass substrate 2 and 3 were used as a substrate of the couple of the liquid crystal device 1 in the above-mentioned embodiment Although the transparent film which consists not only of this but of synthetic resin could be used and epoxy adhesive was used as a sealant 6, you may use photo-setting resins, such as not only this but ultraviolet-rays hardenability resin. In this case, what is necessary is just to use the Mitsuteru gunner stage which replaces with a heating means and irradiates light, such as ultraviolet rays. Furthermore, although the pressure portion material 14 is the composition which pressurizes the pressurizing plate 12 through two or more coiled spring 13 as a force means in the above-mentioned embodiment, you may be the load plate of specified weight, for example not only this but, and actuators, such as an oil hydraulic cylinder, may be used.

[0015]

[Effect of the Invention] As explained above, according to this invention, the substrate of the couple which pinched the sealant is made into 1 set. As the substrate of at least 1 or more sets of couples is piled up, when arranging between pressurizing plates, Since the pressure distribution member which connotes a fluid among the substrates of 1 or more sets of couples between the outermost substrate and the pressurizing plate which counters this has been arranged When a pressurizing plate is pressurized by a force means, it will be pressurized by the substrate of 1 or more sets of couples through a pressure distribution member, and at this time For example, even if dispersion arises in application-of-pressure

distribution with deformation of a pressurizing plate and factors, such as per piece, at the force means side, in order for the fluid in a pressure distribution member to flow according to the dispersion and to absorb dispersion in application-of-pressure distribution, Planar pressure distribution of each substrate can be made into homogeneity, and, thereby, the gap between the substrates of a couple can be formed in homogeneity. After [in this case,] it pressurized by the force means and the pressure distribution member has maintained planar pressure distribution of each substrate at homogeneity by having a heating means to form a sealant with thermosetting adhesive and to heat with the curing temperature of this sealant It can heat with the curing temperature of a sealant by a heating means, a sealant can be stiffened, and, for this reason, the gap between the substrates of a couple can be formed in homogeneity with a sufficient precision. When [moreover,] the fluid of a pressure distribution member is the matter which has thermal resistance, such as silicone oil and silicone gel Even if it pressurizes each substrate by a force means and heats by a heating means in this state at the curing temperature of a sealant, there is almost no pressure variation by the thermal expansion of a fluid, and, for this reason, it can pressurize by the about 1 constant-pressure force during heating.

[Brief Description of the Drawings]

[Drawing 1] The front view having shown one embodiment of the manufacturing installation of the liquid crystal device of this invention.

[Drawing 2] The expanded sectional view of a liquid crystal device.

[Drawing 3] The front view having shown the manufacturing installation of the conventional liquid crystal device.

[Description of Notations]

1 Liquid Crystal Device

2, 3 Glass substrate

6 Sealant

8 Base Plate

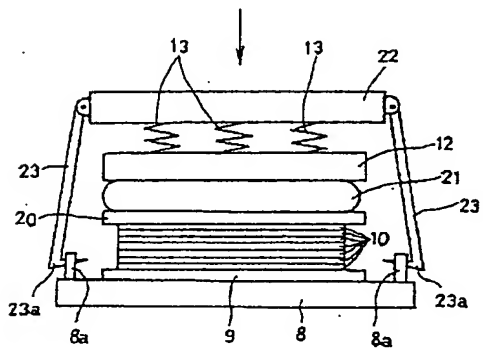
12 Pressurizing Plate

13 Coiled Spring

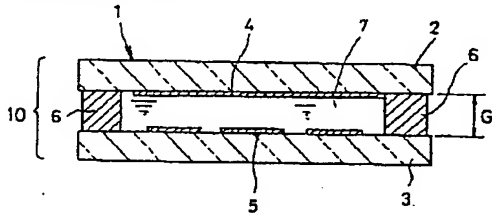
21 Pressure Distribution Member

22 Pressure Portion Material

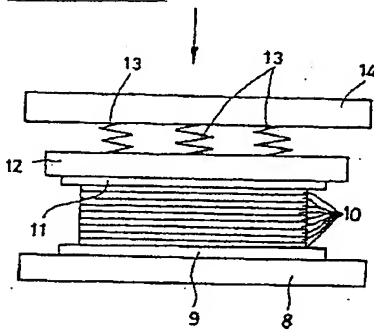
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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